Appendix C

**EMS Communications
(Capabilities and Services)**

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EMS COMMUNICATIONS
(Capabilities and Services)

Through a number of hardware and software equipment and applications, the Memphis and Austin Service Centers offer a variety of communications services and capabilities that allows TPs to file tax returns and electronic documents. These capabilities include both digital and analog communication services as well as several file transfer protocols. The use of these features is summarized in this document.

C.1   DIGITAL SERVICE

Use of digital services requires authorization from the IRS. Please contact the following:

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The following paragraphs describe the hardware and software necessary to use the digital communication service.

C.1.1   CISCO 7206 ROUTER

Two (2) Cisco 7206 routers have been installed in both Austin and Memphis. Each Cisco 7206 has an aggregate bandwidth of 600 Mbps and contains six slots for communications adapters. While one of the routers is a hot spare, the active 7206 is configured as follows:

- One (1) Ethernet adapter with four (4) ports--10 Mbps each port

- Two (2) ISDN adapters--each adapter supports 4 ports at 128 Kbps each port

- One (1) High speed synchronous adapter, which supports eight (8) ports

- One (1) High speed synchronous adapter, which supports four (4) ports

- All high speed synchronous ports support speeds up to 2.048 Mbps. Connections to these ports are mostly through the Kentrox unit described next, although some TPs have connected to the interfaces, directly from their own high-speed communications equipment

TPs use Point-to-Point Protocol (PPP) link encapsulation methods when connecting to the ISDN ports. They use either PPP or Frame Relay link encapsulation when connecting to the high speed synchronous ports.

C.1.2   KENTROX D-SERV

The Kentrox D-SERV is the Channel Service Unit/Digital Service Unit (CSU/DSU) to be used by TPs desiring a direct connect 56 Kbps digital circuit. It meets all the requirements of the AT&T Technical Publications TR 62310 and TR 41450. TPs must purchase a D-SERV unit and a 56 Kbps digital circuit to begin testing over a dedicated line. The D-SERV unit ordered by the TP must be designed for connection to the Kentrox Universal Shelf listed below. If the TP has ISDN capabilities he/she may want to test the digital services prior to the actual installation of his/her dedicated equipment. To do this he/she may use an existing Integrated Services Digital Network (ISDN) circuit for testing. Information on the ISDN service is provided in a later section of this document. The D-SERV interface cards should be configured as follows:

- V.35 interface--configuration switch S1 UP and interface switches S1-S5 DOWN and S6-S10 UP.

- Constant Carrier--configuration switch S2 DOWN.

- Data Clock--56 Kbps, synchronous, internal clock. S3 UP, S4 DOWN, S5 UP, S6 UP and S7 DOWN.

C.1.3   KENTROX UNIVERSAL SHELF

A Kentrox Universal Shelf has been installed in the Memphis and Austin Service Centers. Each shelf supports up to twelve 56 Kbps D-SERV interface cards.

C.1.3.1   Communication Lines

C.1.3.1.1   Dedicated Lines

For a TP to connect over a dedicated line he/she must purchase the circuit and the Kentrox CSU/DSU card. Once the TP's request for digital service is approved, the IRS provides him/her with IP addressing and routing information.

C.1.3.1.2   ISDN Circuits

Memphis and Austin each maintain a bank of ISDN lines for TP connections. The ISDN telephone number and the SPID (Service Profile Identifier) are provided to a TP once his/her request for connection via ISDN is approved.

C.1.3.2   Communication Services

Connection to the EMS system using the digital communications services provides the TP with a Transmission Control Protocol/Internet Protocol (TCP/IP) interface. To use this service the TP must have the following:

- A system that supports the TCP/IP protocols.

- The ability to make a TELNET connection from his/her system to an EMS host.

- If the TP plans on using File Transfer Protocol (FTP) for data transfer, his/her system must support an FTP server and have the ability to accept an FTP connection from the EMS. The TP must supply a user logon and password for the EMS system to use when connecting to his/her FTP server.

- A router capable of supporting PPP or Frame Relay over the digital circuit.

Once the TP establishes a connection using EMS digital services the following capabilities are available.

- Connecting over a TCP/IP link allows a TP to connect to any host available to him/her at the Service Center.

- Fail over protection. EMS systems have a fail over capability and if there is a system failure a backup system becomes available. This system uses the same TCP/IP address as the primary system. This allows the TP to connect to the backup system without having to reconfigure the host address.

- Transfer of data using FTP. If a TP has a host system that supports FTP, he/she may use this as a protocol to send and receive files to the EMS system. See Section C.3, Communications Protocols for more details.

- File transfers over TELNET. If a TP uses TCP/IP to connect to the EMS system, his/her logon to the system is through TELNET. If the TP does not want to use FTP to transfer files, he/she may use another file transfer protocol such as Zmodem over the TELNET session. This capability is currently available in many of the TELNET application programs. The file transfer rate of Zmodem over a TELNET session is not as fast as FTP. For this to be used successfully the TP's TELNET program must support connections that allow all 8 bits of the data to pass through. This is often accomplished on the TELNET command line as "telnet –8 host". See Section C.3, Communications Protocols for more details.

One final aspect of a TCP/IP connection to the EMS is that TCP/IP supports multiple simultaneous connections to the same host or multiple hosts. A TP may submit files over multiple concurrent sessions. However, only one session per host can retrieve acknowledgment files.

C.2   *ANALOG SERVICE*

The following paragraphs describe the hardware and software necessary to use the analog communication service.

C.2.1   *CISCO AS5300 ACCESS SERVER*

All analog connections to the EMS system are made through the Cisco AS5300 access server. The access server maintains a bank of asynchronous modems capable of 56 Kbps. Once the modem connection is established the TP's session to the host is over a TELNET TCP/IP service. This combination of high-speed modem and LAN connection can result in speeds in excess of 12,000 bytes per second. It is recommended that the TP use a 56k modem with v.90 support for speeds up to 56K, v.34 support for speeds down to 2400 bps, v.42 support of error correction, and v42 in support of compression. In addition to a modem, the TP needs asynchronous terminal communication software and software supporting one of the file transfer protocols described in the Section C.3, Communications Protocol section below.

C.3   *COMMUNICATIONS PROTOCOLS*

The EMS system supports a variety of communications protocols for transmitting and receiving data. The protocols are described individually but a generic step by step tutorial of a connection to the EMS system may prove helpful. This tutorial goes through the interface at the highest level but mainly focuses on communications issues. The following is a sample of an IMF (1040) connection.

1) The TP must have a computer system containing his/her software for return preparation as well as communications software. The communications software may be included, as part of the return preparation or it could be external and part of the computer operating system. For the purposes of this tutorial, a Windows system with an external communications interface is described. It should be noted that a system with communication embedded in the preparation software would have to perform the same basic functions as the external interface.

2) With a return file ready to process, the TP must pick a method of connecting to the EMS system. An easy example from the Windows system is to use the standard communications accessory, HyperTerminal.

3) HyperTerminal is a terminal emulator and to connect to EMS several things need to be set properly:

   • 8 bit no parity

   • Hardware flow control, also known as CTS/RTS

- Speed--This should be set to the highest value allowed by the system. A note of caution here. Depending on the quality of the modem and phone line, TPs may have problems using the highest value allowed. If a TP has problems, he/she should decrease the speed until a reliable connection with EMS is established.

4) The TP then issues the command to have HyperTerminal dial out to the EMS system. Telephone numbers are given to TPs once they are approved for EMS connection. The session connects and the EMS system begins a dialog with the TP. This dialog is controlled by a program know as the Trading Partner Interface.

```
****************************WARNING**********************************
            Unauthorized access is prohibited by Public Law 99-474
                   "The Computer Fraud and Abuse Act of 1986"

             This is a United States Government system.  It is intended for
             the communication, transmission, processing, and storage of
                      official and other authorized information only.

                   USE OF THIS SYSTEM CONSTITUTES CONSENT TO
                   MONITORING AT ALL TIMES AND IS NOT SUBJECT
                           TO ANY EXPECTATION OF PRIVACY.

AUTHORIZED USE ONLY!  ACCESS TO THIS US GOVERNMENT SYSTEM CONSTITUTES CONSENT
TO MONITORING FOR LAW ENFORCEMENT AND OTHER PURPOSES.


login: 99999
Password:********
Last login: Tue Sep  4 10:39:31 from computername
```

5) At this point several lines of system data followed by a menu appears.

```
        --------------------------------------------------------
            F O R    O F F I C I A L    U S E    O N L Y

                   #     #####    ####
                   #     #    #   #  #
                   #     #    #    #    ####
                   #     #####       #
                   #     #   #  #   #     #
                   #     #    #   #    ####


                  U.S. Government computer

           F O R    O F F I C I A L    U S E    O N L Y
        --------------------------------------------------------


           MAIN MENU

           1) Logoff
           2) Receive/Send File(s)
           3) Change File Transfer Protocol [ZMODEM]
           4) Change Compression Method [NONE]
           5) Request Transmission Status Report

     Enter your choice:   2
```

6) In nearly all sessions the TP selects item 2 to send or receive files. Item 3 shows the file transfer protocol configured for the TP. Item 4 shows whether or not he/she is configured for sending and receiving compressed data. This tutorial does not discuss modifi-cation of these settings. This tutorial does not discuss Item 5, "Request Transmission Status Report."

7) After transmitting a 2, the system notifies the TP of how many acknowledgment files are waiting for pickup. For this example we assume that 3 files are waiting. The Trading Partner Interface then sends the following:

    Number of Acknowledgment File(s) in outbound mailbox: 003

    Are you ready to receive files? Y/[N]:

8) The TP responds with a "Y".   The system starts trying to send data using the configured protocol. If the TP's system requires it, the TP issues a command to start receiving the data.   In this tutorial the TP is configured for ZMODEM. HyperTerminal as well as most other terminal emulators automatically detect that a ZMODEM transfer has begun and starts the ZMODEM program to receive the file. Using ZMODEM, the Trading Partner Interface sends all three acknowledgment files

sequentially. The TP must then take these files and process them.

9) Assuming that all went well with the transmission of the acknowledgment files the Trading Partner Interface sends the following message:

Acknowledgment File(s) transmission complete.

Do you want to send a file? Y/[N]:

10) If the TP has a file to transmit, he responds with a "Y". The Trading Partner Interface then issues the following:

Enter an upload command to your modem program now.

11) At this time the TP starts a ZMODEM transfer to the host and sends the file he wants to have processed. At the same time the Trading Partner Interface program starts a ZMODEM program to receive the return file.

12) The file transfer eventually terminates. If the TP watches the ZMODEM file transfer progress, he notices a slight pause after the transfer completes and then the following message appears:

Transmission file has been received with the following GTX Key:

S20041020123423.1700   10200001

13) These lines are two of the more important messages that appear, because even though the ZMODEM program completed the transfer, the operation is not really complete until these messages are displayed. If the TP disconnects after the file transfer completes but before the messages appear, the file is not guaranteed to be processed. To complete the session the TP is presented with the main menu as follows:

        MAIN MENU
        1) Logoff
        2) Receive/Send File(s)
        3) Change File Transfer Protocol (ZMODEM)
        4) Change Compression Method (NONE)
        5) Request Transmission Status Report

14) The TP now selects item 1 to logoff the system. After the following message is received the TP can safely hang up.

DISCONNECTING FROM EFS.

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15) The logoff from the system is equally as important as waiting for the transmission complete messages listed above. This ensures that the session statistics are recorded and that the data is processed.

This concludes the tutorial. An in-depth description of all supported protocols follows.

C.3.1   ZMODEM

ZMODEM is the most popular protocol used today. It is considered to be the fastest and provides a checkpoint restart capability that allows a file transfer to be restarted, if the transfer was disrupted because of communications errors. Because of this restart capability there are several options that may be found on the user's system that the user should be aware of:

- Restart/recovery is an option that must be configured on the TP's system if he/she wants to use the recovery feature. If the TP does not configure the ZMODEM software to recover then it will attempt to send the entire file again.

- If the TP had a disruption and attempts to send the same file without doing a restart/recovery, the transfer could fail because part of the file already exists on the EMS system. One option, file overwrite, available on most ZMODEM programs allows existing files to be overwritten. So if the transfer has been disrupted and restart/recovery is not configured, the TP must reconfigure ZMODEM to overwrite existing files.

- The problem described above can also affect other communications protocols. For example, a TP tried to send a file using ZMODEM, had a disruption, and then tried to re-send the same file using a different protocol; if the alternate protocol tries to use the same file name and does not have its option to overwrite turned on, the transfer will fail.

C.3.2   FTP

FTP protocol is a standard package included as part of the TCP/IP software suite. It is only available to TPs who use the Digital Communications Service For TPs using this transfer method the only configuration needed is to setup a user account for EMS to use and directories for EMS to use to "get" return files and "put" acknowledgment files. EMS transmits one file for each acknowledgment file available for processing. The file transfers are binary and the "#" hash mark is displayed for every 1,024 bytes of data transferred.

`C.3.3`   `XMODEM-1K`

XMODEM-1K is an updated version of XMODEM that uses a packet size of 1024 bytes. This makes a dramatic improvement in throughput over XMODEM.

`C.3.4`   `YMODEM - BATCH`

YMODEM batch is the predecessor to ZMODEM.